INTRODUCTION

1. Subject of physics. Physical methods of research. Physics and technique. Computers in modern physics

1.1. Subject of physics; its relationship to philosophy and other sciences

We are going to study physics that is a science about nature. There are many sciences about nature, such as chemistry, biology, geology etc; physics is distinguished from them by studying the most common matter movement forms. So chemistry studies chemical reactions which consist in rearrangement of electron atomic and molecular shells that is a physical process; biology studies the processes connected with the heat interchange, electrical current flowing in living organism which are the physical processes also. There are the sciences border areas as physical chemistry and chemical physics, biological physics, biological chemistry, geophysics, geochemistry, astrophysics etc. Giving examples show that between difference branches of science the sharp bounds are absent but physics elements present always at all nature sciences.

As a science about the nature physics is closely coupled with other sciences, in particular with philosophy. For philosophy physics gives the real material used by philosophy for different generalization and conclusions. From other hand philosophic assertions often assist to physicists to give interpretation founded phenomena and regularities.

1.2. Physical methods of research: experiment, hypothesis, theory. The concept of physical models

An experiment is the main method by which physics researches visual environment. But theory also plays important role in our cognition of world. Its role is rising especially now in consequence of that by extend broaden one's knowledge about nature our conceptions become more and more abstract and therefore for explaining the modern experiment results the very abstract conceptions may be used. In physics history the cases are known when very improbable ideas firstly were expressed and appreciably later found experimental confirmation. As examples of this assertion we will give the electromagnetic waves and Maxwell's theory of the electromagnetic field, self energy of the bodies, dual character of the matter and existence at the particles the wave properties.

Physical theory operates with the objects which are named the physical models. The physical model is a concept that reflects the most essential features of the phenomenon or of object and allows their comparatively simple mathematical description. As examples of physical models we may denote so that material point, uniform motion, rigid body, continuous medium, ideal gas, point charge, homogeneous field, harmonic oscillation, monochromatic wave (in particular monochromatic light), absolute black body, infinite deep potential well, etc.

1.3. Physics role in the development of technology and the impact of technology on the development of physics. Physics as a fundamental science

Physics history shows that significant physical discoveries lead to considerable progress in the humanity productive forces. So, after discovering Archimedes principle rapid growth of the navigation was observed; after discovering Newton laws Britain becomes a world smithy; discovering thermodynamics laws and gas laws led to the development of the steam engine and their mass application that allows to name 19 century as the vapor century; the electromagnetic induction phenomenon discovering by Faraday underlies of the work of energy induction generators and led to their intensive application that allows to name 20 century as the electricity century, and to intensive application of the electromagnetic waves in particular in the communication engineering; famous discoveries in the area of nuclear physics led to the nuclear arm creating and initiate to nuclear power engineering, technique of the radioactive radiations; finally outstanding achievements in area of quantum physics led to creation of contemporary spectroscopy, of solid-state electronics, of quantum electronics in particular of laser technique, computers technique, etc. Last circumstance gives the base to name physics *fundamental science*.

From stated above it is followed physics effect upon the technique is exceeding. So there is an inverse effect. The time when physicist can restrict oneself by the comparatively simple devices and attachments was over. Today's researcher is armed by the complicated and powerful attachments such as lasers, modern accelerators, radio-telescopes, electronic and ionic microscopes, different attachments for the ultralow and ultrahigh temperatures obtaining, different cosmic attachments and others. Besides a lot of materials and methods created for definite physical researches later found successful application at the different area of the science and technique.

Researches in physical area become so complicated and high-priced that from one hand state concentrated them in definite places which are named the *scientific cities.*

On the other hand the states combine their efforts for realization of the most ambitious projects that are essential important for the whole humanity so as Large Hadron Collider, (briefly, LHC), the works in the area of the controlled thermonuclear fusion.

Given examples show there is a close coupling between physics and technique, they mutually complement and enrich each other.

1.4. Computers and mathematical simulation in modern physics

With computers appearing in physics development new stage becomes. This stage is characterized first of all by appearing of possibility to solve new problems. We will name some of them. First of all the possibility of considering the more complicated physical models appeared. Computers applied as the elements of the experimental attachments or by other words they are used for automation of the experimental attachment. Besides in physical research computers are used when the mathematical simulation of the one or another phenomenon is realized.

2. The common structure of physics course and objectives of physics studying in technical university

2.1. The common structure of physics course in technical university

Course of physics in the in technical university consists of the next chapters:

- the physical fundamentals of mechanics;
- the fundamentals of molecular physics and thermodynamics;
- the electrodynamics;
- the oscillatory and wave processes;
- the wave optics;
- the elements of quantum physics, atoms and molecules physics;
- the elements of the condensed matter physics;
- the nuclear physics and elements of the elementary particles physics.

2.2. Objectives of physics studying in technical university.

We will emphasize that physics is an integral science and therefore when one studies physics it is impossible to restrict oneself by some from giving above chapters only. Thereby in the physics studying one of the important tasks consists in acquirement of a scientific method of the world cognition by the students and training of the integral picture about surrounding world. On the base of these feature technician becomes more receptive to perception of new technical ideas, and his ability to advancement of new ideas arises also. So, good knowledge of physics makes the technician more competitive on the labour market and more advanced to acquirement by the allied specialty if the necessity arises therein.

The next task in the physics studying consists in support of general scientific and special courses needs such as theoretical mechanics, electrotechnics, electronics, different courses connected with technical thermodynamics and so on. Besides during the physics studying students must learn to estimate the errors of the measurement and learn to handling with the modern physical devices,

At last the students must receive the idea about physical phenomena and physical laws describing its which may be used in their future professional activity.

Control task

2.1. Which of physical phenomena are known to you? Please describe some of them.

2.2. By what methods physics learns world around? Please indicate the phenomena, which being at first discovered experimentally, have played a huge role in the mankind life.

2.3. Please indicate the phenomena, which being at first prognosticated theoretically, have played a huge role in the mankind life.

2.4. Please, give characteristic some of physical models.

2.5. What are the reasons which allow considering physics as fundamental science?

2.6. Which of international projects in physical area are known to you?

2.7. Please, give examples of computers using in solving physical problems.

2.8. Please, give examples of physical phenomena and physical laws using in your future professional activity.